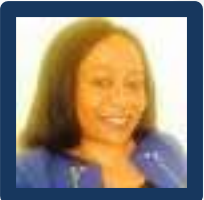


IDEA Campus Energy 2018

UNIVERSITY OF MARYLAND
Securing Our Networked
Utility Infrastructure

University of Maryland Presenters



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Engineering & Energy



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Engineering & Energy, Facilities Performance Group

University of Maryland College Park

- The University is a leading public institution that is home to more than 37,000 students and 9,000 faculty and staff members.
- The main campus is 1,340 acres with over 14M GSF of academic, research, office, arts, residential, athletic and dining space spread among the more than 250 buildings.



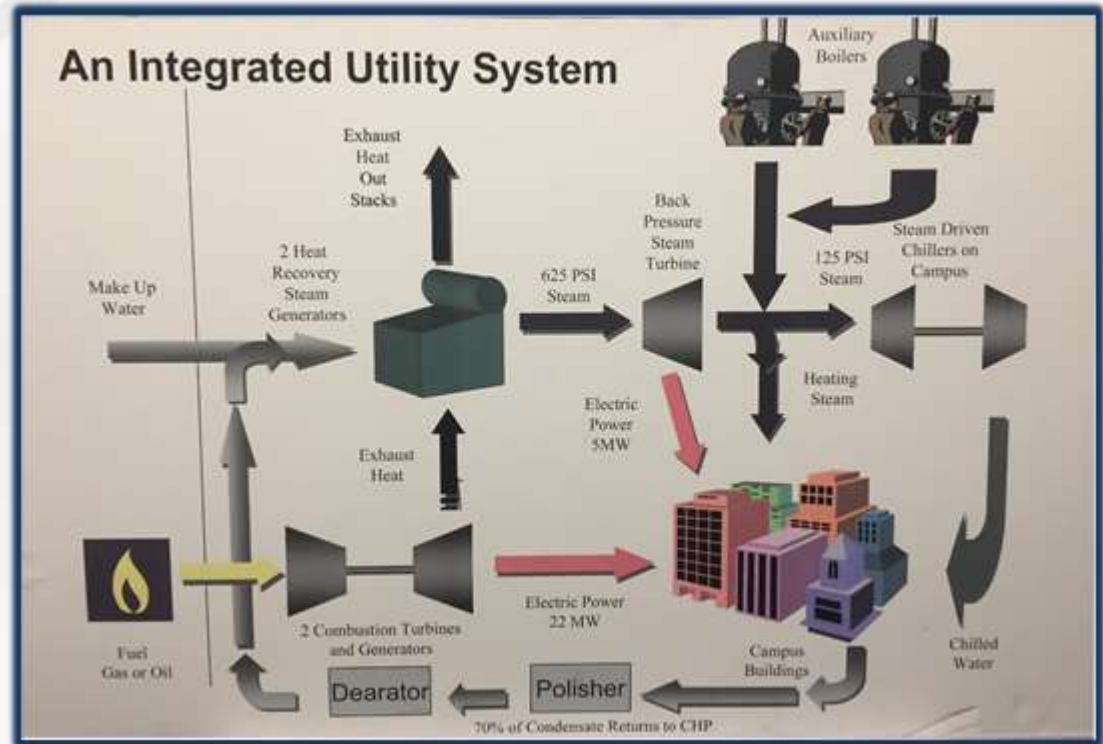
District Energy System

- The University has a District Energy System known as College Park Energy (CPE) that supplies the campus buildings with electricity, steam and chilled water.
- The energy distribution system is a underground network of 10 electrical feeders and 15 miles of underground steam and chilled water piping.
- The campus co-generation plant can supply up to 27MW of electrical power and 280,000 Lbs. of steam per hour at 115 PSIG to the system.
- Over 30,000 Tons of Chilled Water Production.



Remote Utility Monitoring

- The integrated Utility System was completed in 2002.
- The University was able to remotely monitor operations.
- Over the life of the system hardware and software platforms generally remained static.
- This led to a increasing vulnerability to outside threats.
- To protect the system from threats, the decision was made to sever the outside link to the industrial networks and hardware.



Utility Infrastructure

- This left the University with no remote access to the system requiring a physical visit to the Energy Plant to monitor the system operation or to retrieve data for analysis.
- With the Energy Plant 3,300 feet from the Campus Electrical Substation and 1,500 feet the Chiller Plant this also meant no onsite access to the SCADA while onsite at these large system assets.



THE OLD POST

Member of the Associated Press

ILLUSTRATED WEEKLY NEWSPAPER

Est. 1865

Wednesday April 8, 2015

Price Free

Power Failure Closes UMD!

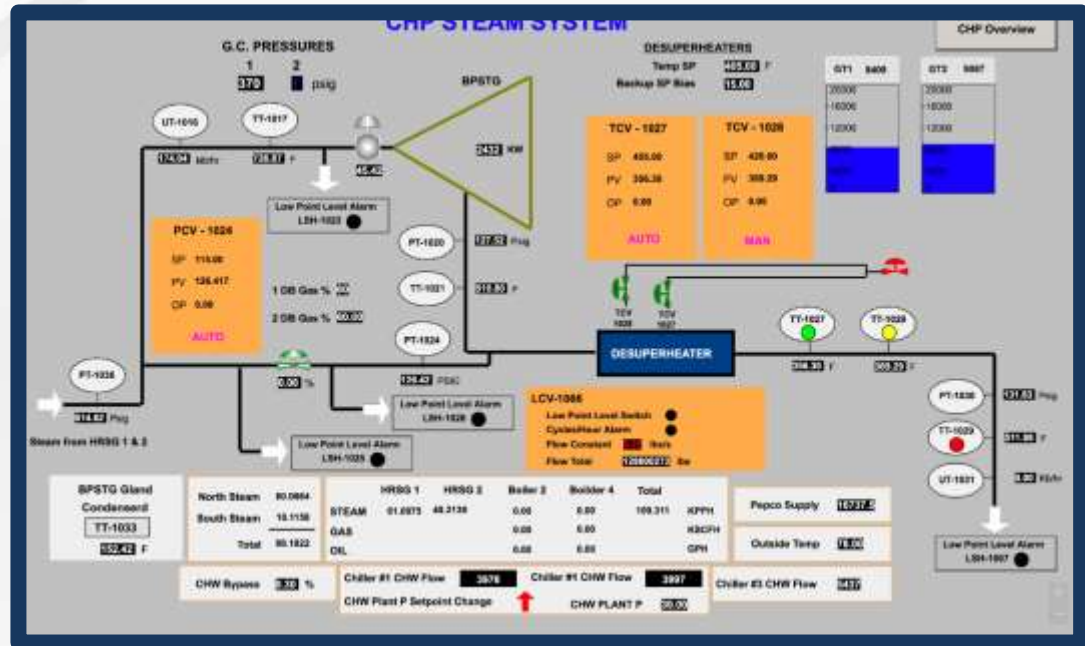
Just before noon on April 7, 2015, a electrical station failure 40-miles South of the University of Maryland affected much of the region and knocked the onsite Co-Generation Plant and Substation offline.

This resulted in the University closing early while personnel worked thru the evening to restore power. A post event analysis indicated remote monitoring would have greatly aided the restoration effort.

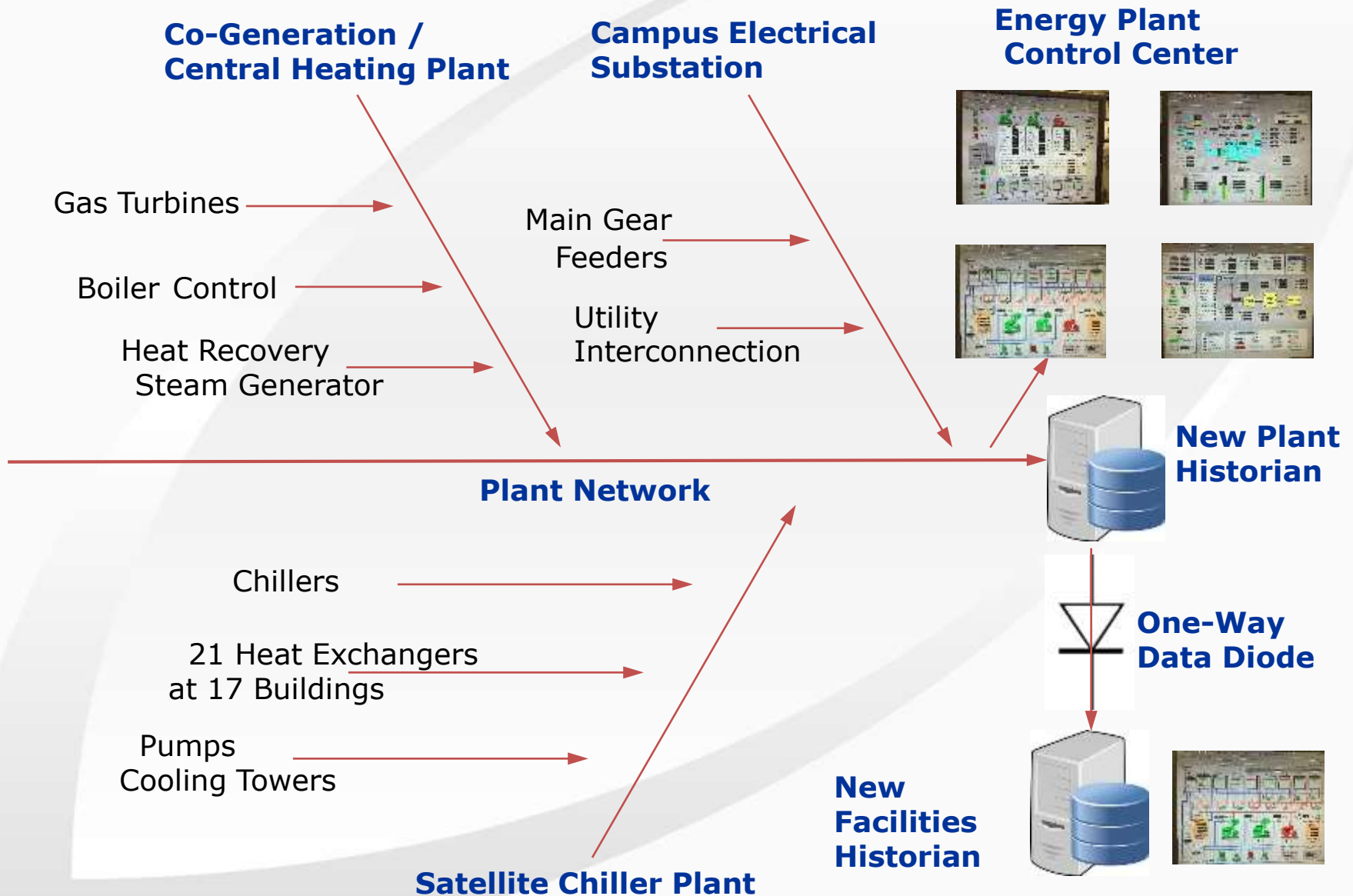


Establishing Our Secure Connectivity To The System

- After the April 2015 power outage the University was introduced to the NIST National Cybersecurity Center of Excellence (NCCOE) Situational Awareness Project.
- UMD served as the real-time data source for this NIST demonstration project.
- The project introduced UMD to a hardware & software solution that NIST utilized for a secure remote connection to the system.
- As a result UMD generated a RFP to permanently deploy those solutions in our production environment.

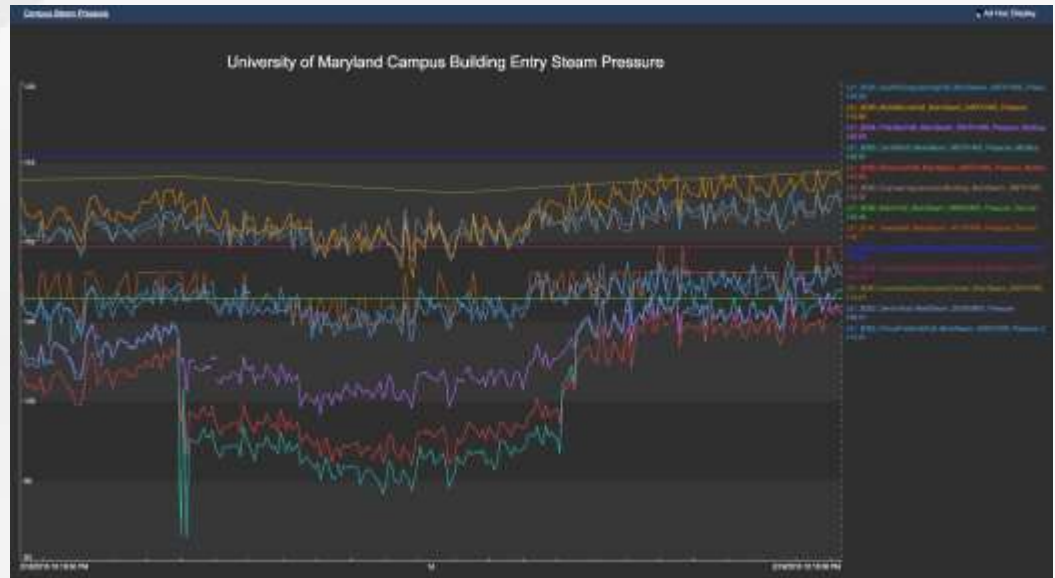


Securing Networked Utility Infrastructure



The Results of the New System

- Remote access to multiple platforms inside the system as well as other systems such as our building entry utility meters.
- The data from the multiple systems is stored in a common time-stamp data base.
- Users have secure browser based access using one interface regardless of where the physical point connects.
- Data can be cleansed if needed and exported to other systems.
- Event Notifications are alerting UMD to problems real-time.



PreinkertHall Building Steam Pressure Dropped below 75 Psig

inbox x



PINotifications@umd.edu

to me

B054 - PreinkertHall Building Steam Pressure Dropped Below 75 Psig.

Current Pressure = 12.02536 Psig

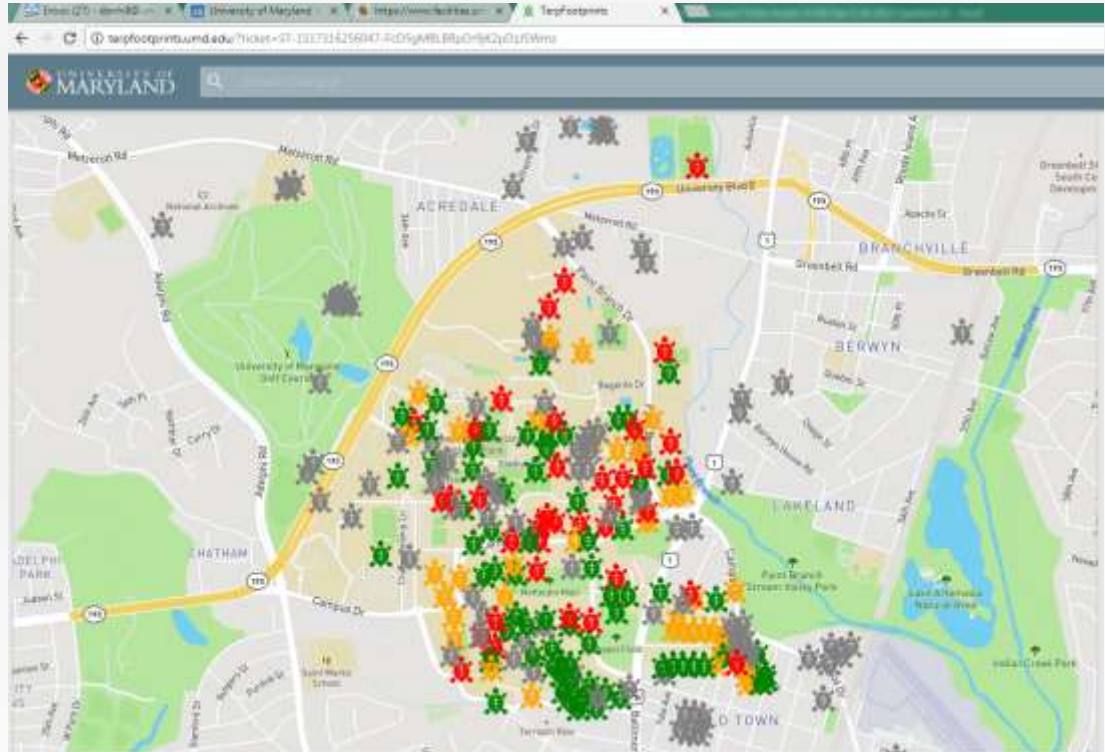
Notification Trigger Time = 1/14/2018 1:36:37 AM Eastern Standard Time (GMT-05:00:00)



[Click here to Reply or Forward](#)

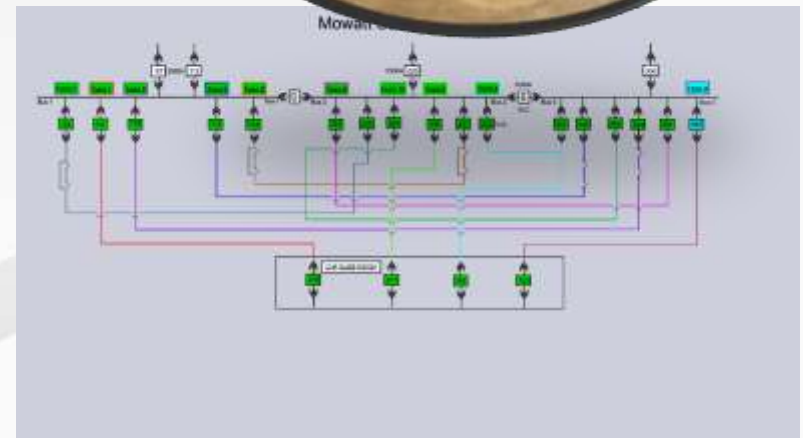
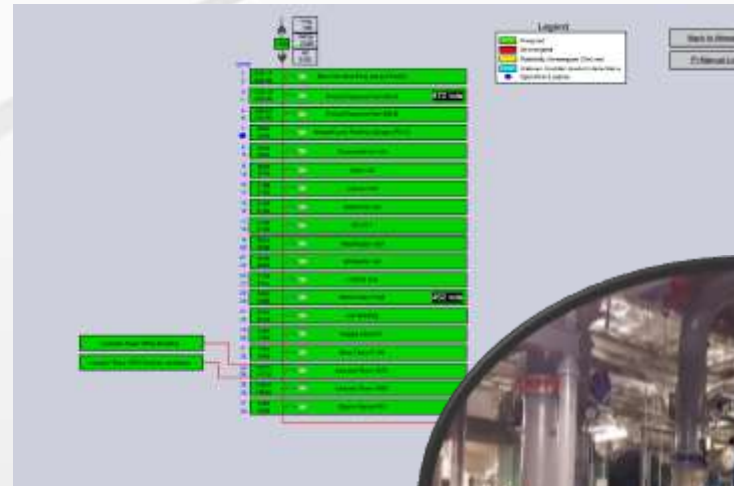
Current System at UMD

- 4,400 Tags of Data continuously polled from 8-different campus systems.
- Visual interface to the Campus Co-Generation Plant, Satellite Chiller Plant 4, Electrical Feeders 1-10, Steam Distribution System and Utility Meter Data.
- Real-time data is feeding ARC GIS Maps of the Satellite Chiller Plant 4 Loop and the Campus Steam Distribution Grid
- Notifications of Critical Events
- Export of energy data to the TerpFootPrints Campus Dashboard.



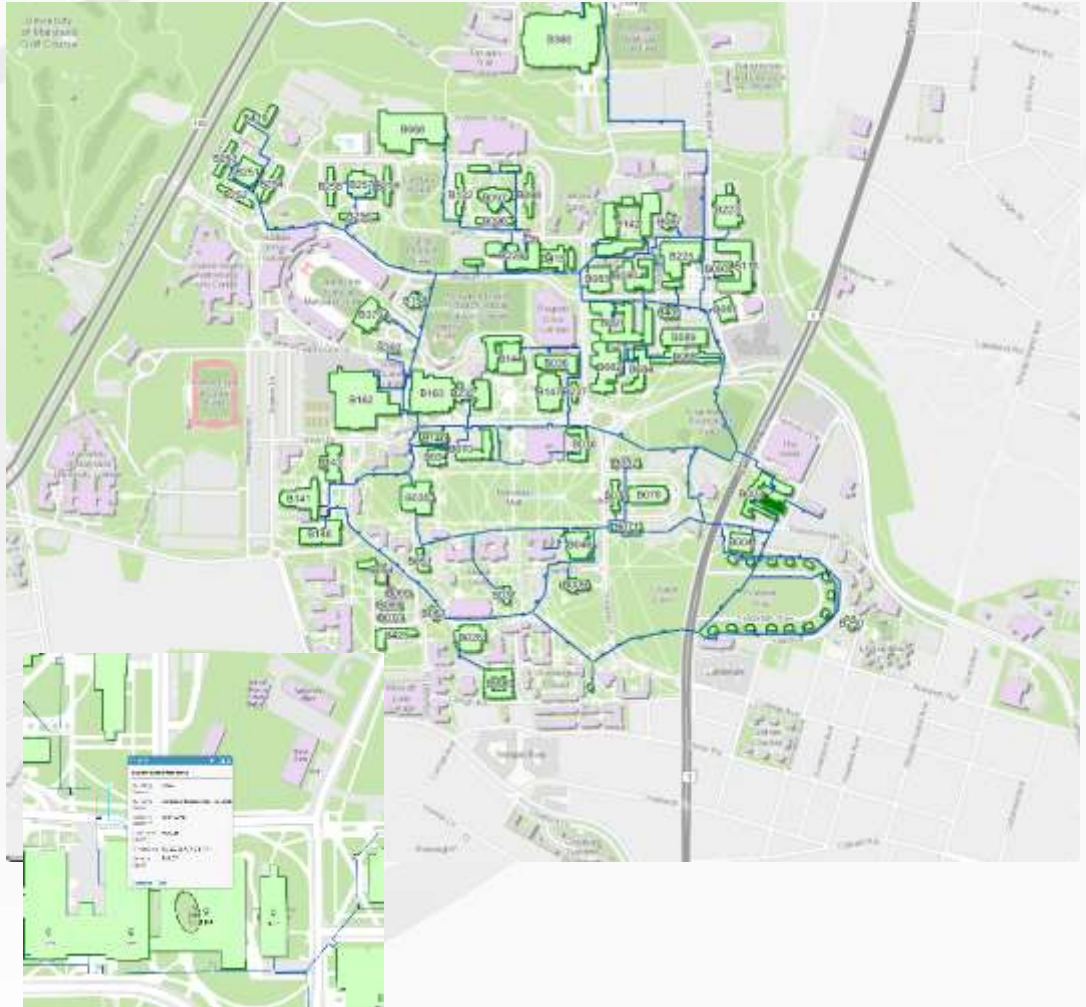
Next Steps

- Linking of the Campus Resource Schedulers to the Campus BAS to smartly operate down to the room level.
- Expansion to all campus satellite utility buildings.
- ARC GIS Maps of all utility grids (Electrical, Chilled Water, Hot Water, Condensate, Etc.).
- Monitoring of Emergency Power Generation & UPS Units.
- Export to reporting tools used by Senior Leadership.

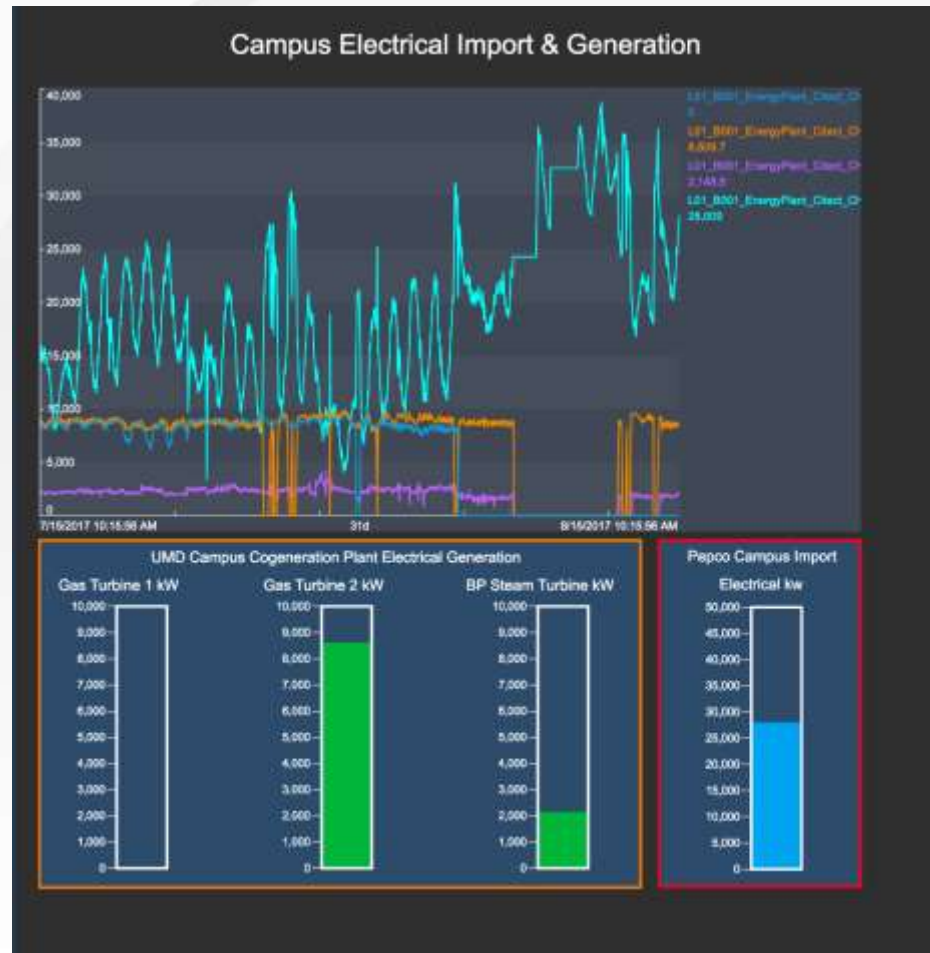


How Has This Helped UMCP

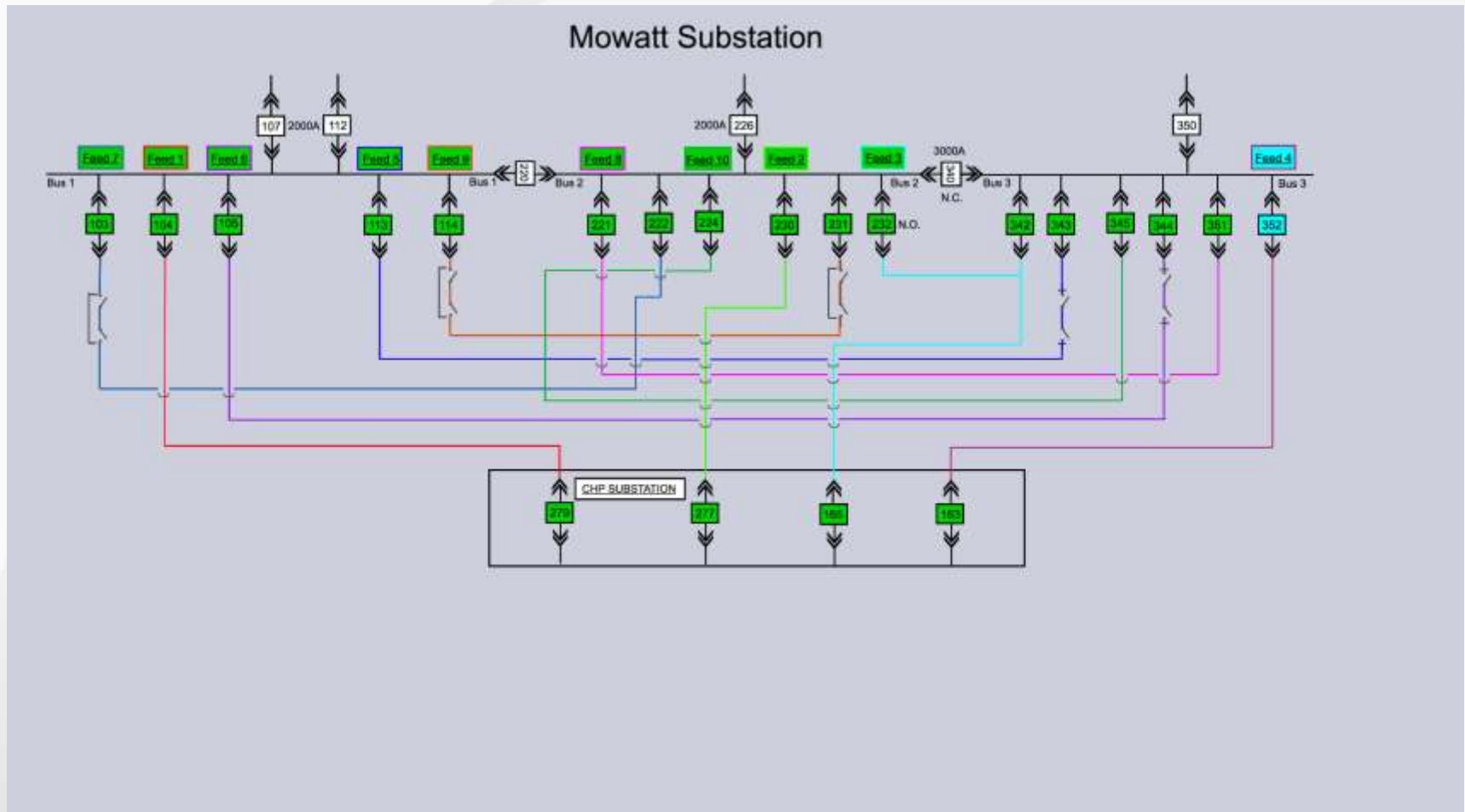
- With the restoration of a secure connection to the CPE System the University is now able to remotely view the operation of the CPE System real time.
- Using products from the NCCOE build UMCP now has homogenized historical data from multiple industrial control systems in one common timestamp database.
- As the conclusion of the UMCP agreement with the 3rd party operator of the CPE system is nearing. The UMCP team is already using the information from the system to assist in crafting the next agreement.



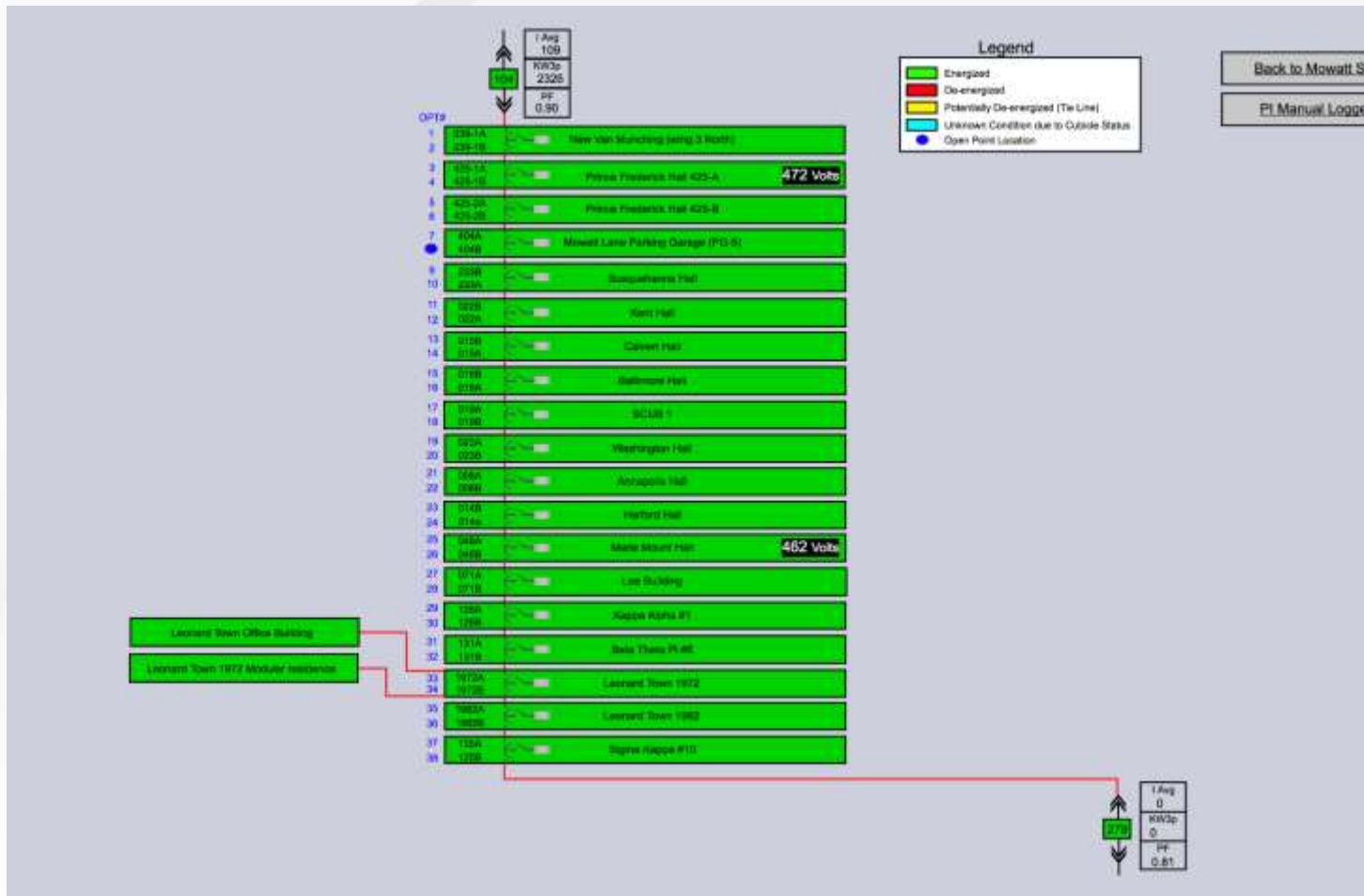
Campus Electrical Import & Generation



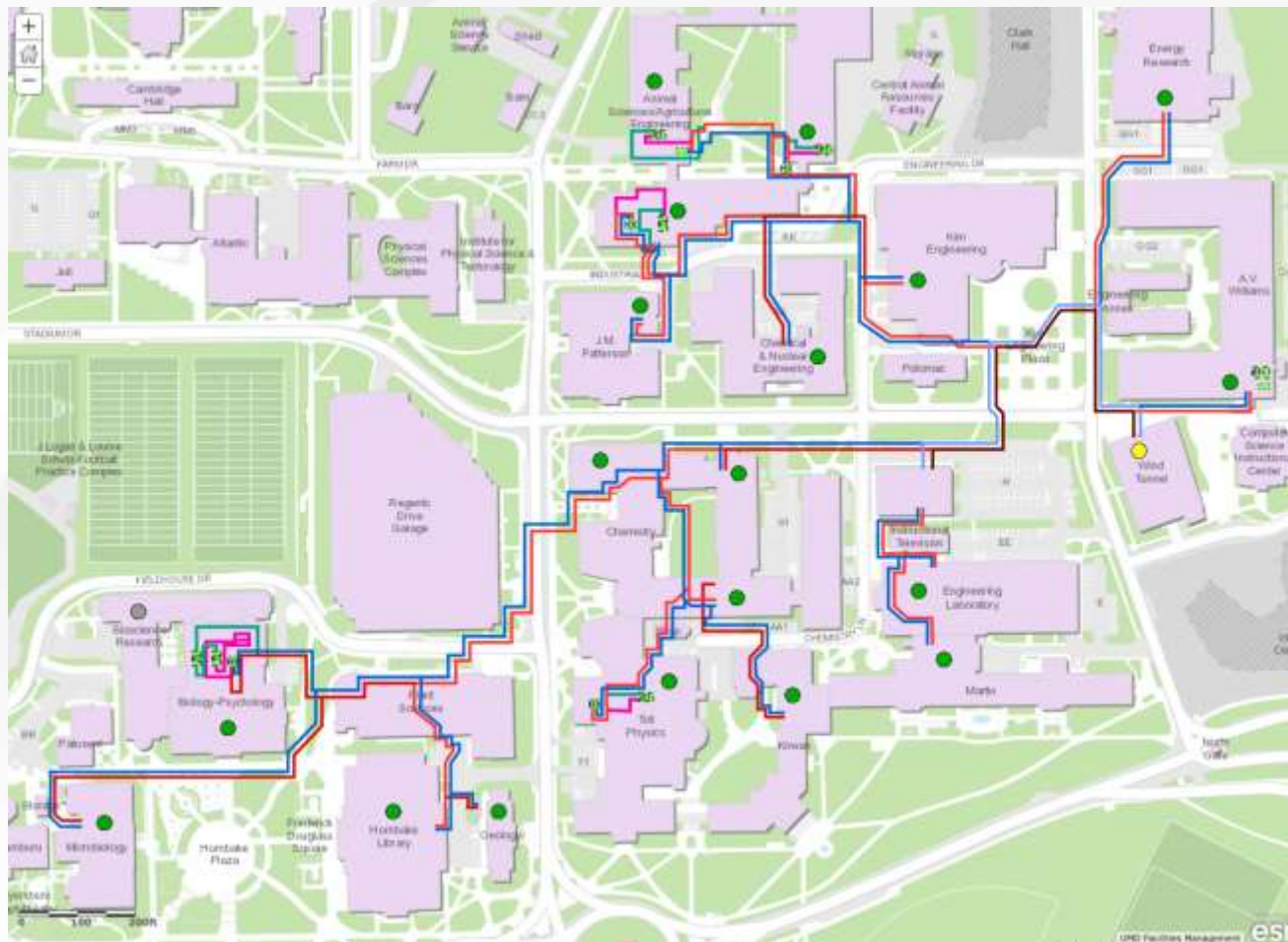
Campus Electrical Substation



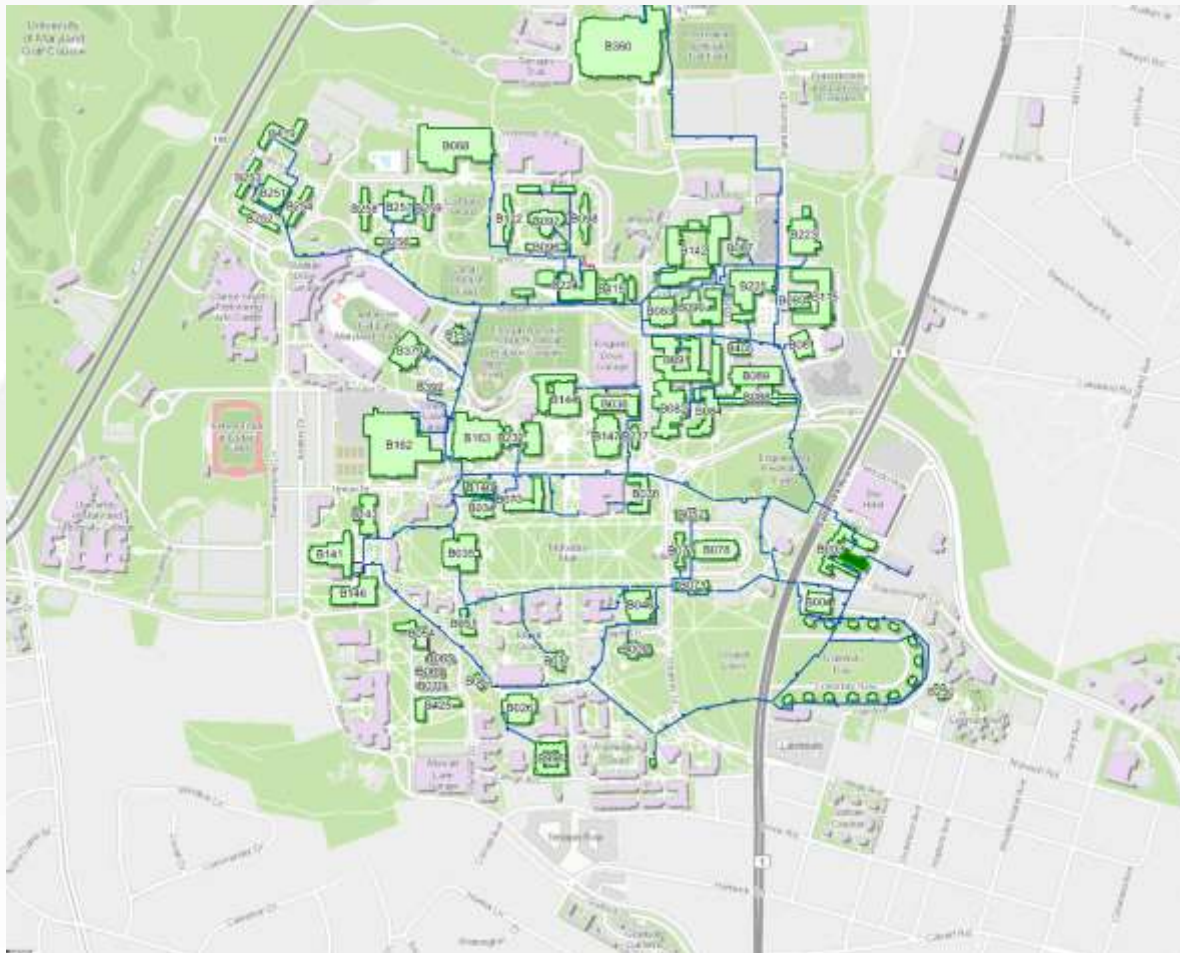
UMCP Electrical Feeder 1



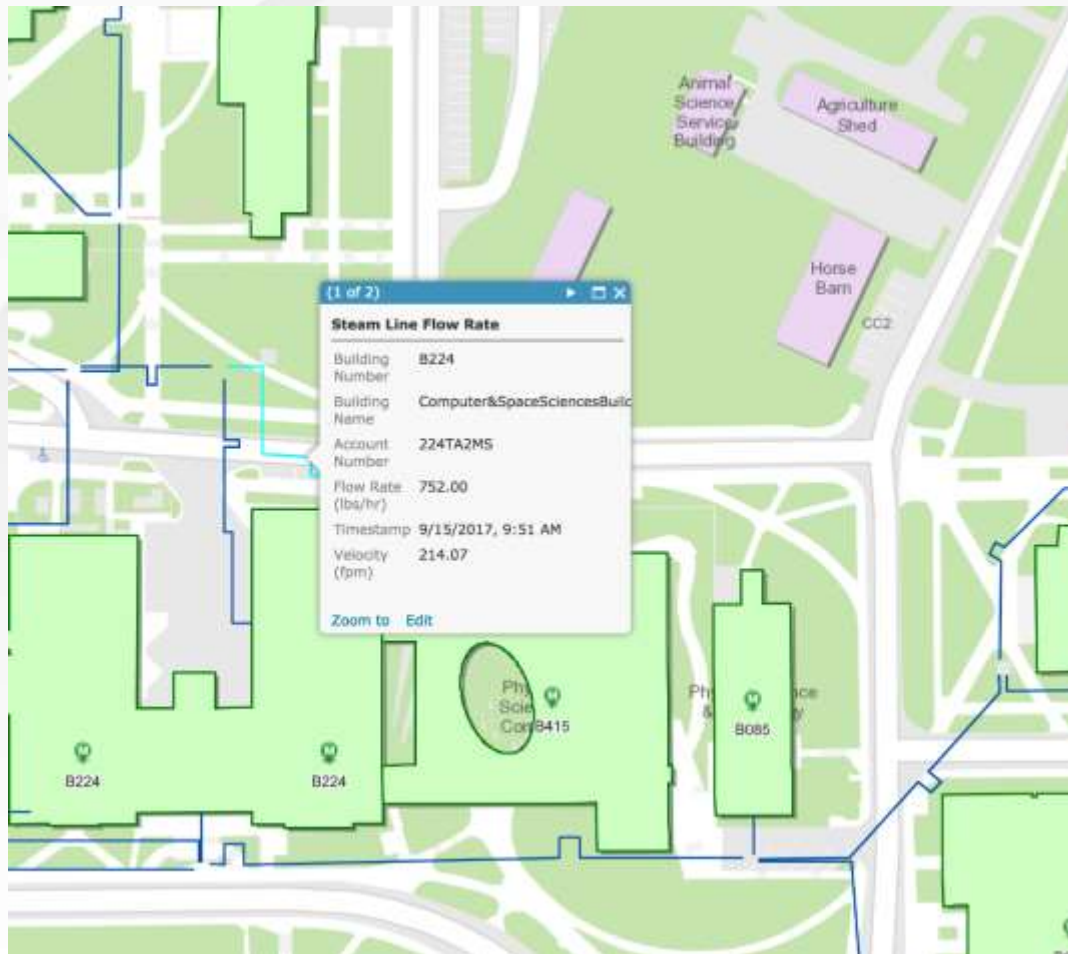
Chiller Plant 4 ARCGIS Live Distribution Map



UMCP Steam Grid ARCGIS Map

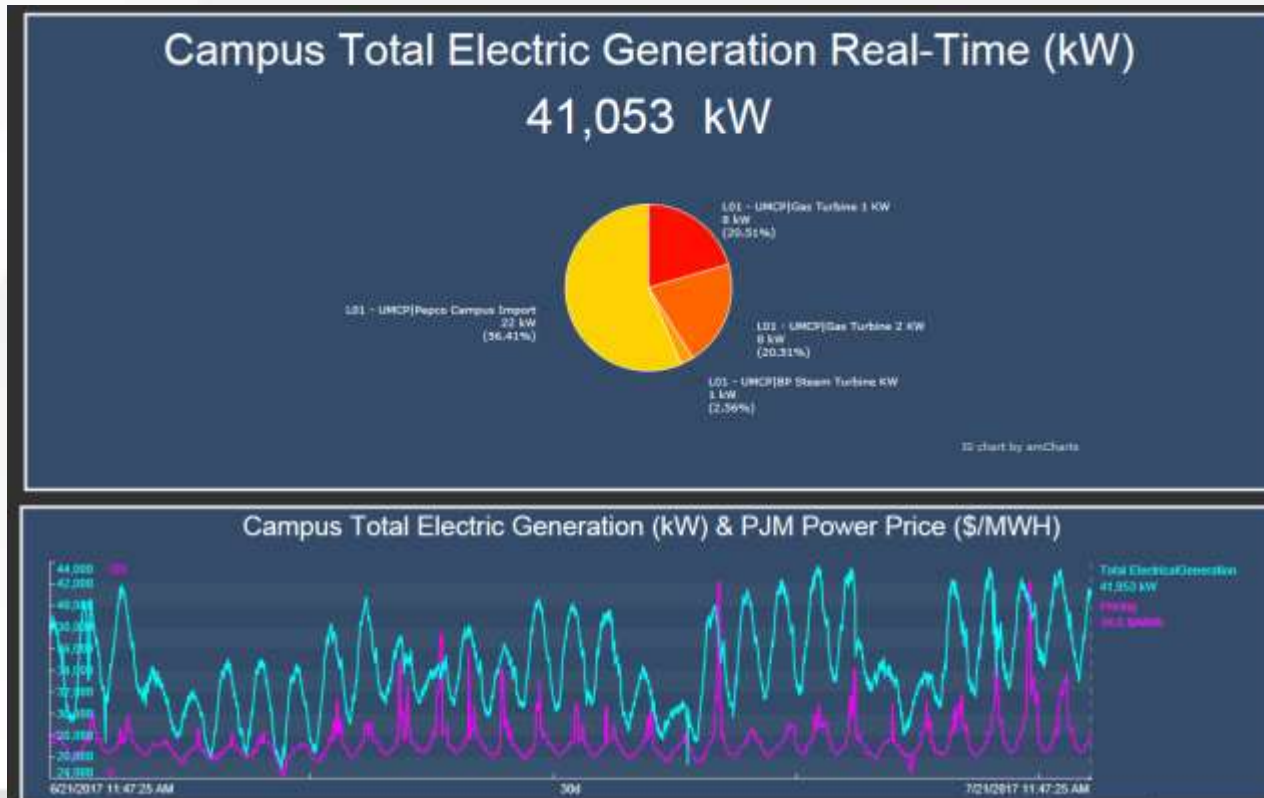


UMCP Steam Grid ARCGIS Building Level Zoom



Multiple Assets Accessed From One System

- This screen pulls data from the Cogeneration Plant and the Data Acquisition System.
- Previously this data could not be seen Real-Time.



Questions?
Thanks for coming!